

SPARKLES UNDER THE NORTHERN SUN: THE DANCKERTS PRESS AND THE SLOW INTRODUCTION OF WRITING ON BUILDING TECHNIQUE IN THE DUTCH REPUBLIC

*Between 1630 and 1727 the rich catalogue of the Danckerts press covered a wide span of subjects in contemporary architecture. This case-study makes clear that in the Dutch Republic the interest in autonomous information on building techniques arose relatively late. Publishers mostly looked to Italy, France and, as is demonstrated here, also to Germany. In the genres discussed, actual building techniques can only be traced to a very limited extent. It is more precise to speak of technical details in the communication of architecture. Only in 1680 the first book with exclusively technical illustrations appeared, *Architectura chivilis*, based on a German source. Danckerts proved to be a pioneer in what would become an independent technical book genre. Around 1700, books on elements of civil architecture, such as roofs and stairs, were accompanied by publications on mills, sluices, and bridges. It was only then that building techniques in the strict sense found their way into books.*

Although a wealth of high-quality books on architecture was published in the Dutch Republic during the sixteenth and seventeenth centuries, some crucial topics remained remarkably underexposed. Technical, material and constructional issues that were faced in actual building practice, for instance, rarely found their way into treatises or engravings. In this article it will be argued that in the Italian-, French-, and Vitruvius-oriented architectural publishing in the Netherlands, technical knowledge remained almost entirely absent until the last quarter of the seventeenth century¹. Although this situation was no different from that in neighbouring countries, this slow introduction of writings on building techniques does contrast with the then lively building practice, showing the interest in these matters among Dutch craftsmen, architects, engineers, and amateurs.

This article sketches the milieu in which descriptions of building techniques, if any, appeared as isolated sparkles in the broad spectrum of architectural books of this era in the flourishing Northern Netherlands². In order to draw some conclusions from the large body of material, the focus will be on the architectural publications of the Danckerts press³. This publishing house was responsible for some of the most important, as well as the majority of architectural books in the Northern Netherlands during the seventeenth century⁴. Moreover, Danckerts' architectural

books cover the span of subjects in contemporary architectural writing in which technical knowledge gradually found its way to print. It will become clear that, when speaking about technical knowledge in architectural books in the sixteenth and seventeenth centuries, the term technique itself will have to be interpreted in a broad sense. Knowledge of building technique is seldom explicitly dealt with and can only be discovered indirectly and in altered forms. Technical knowledge is reflected in the use of technical terminology, in the summing up of building materials, and is most manifest in visual representation, that is, in illustrations displaying technical operations or containing technical or constructional details without these being the main subject. The illustrations can occur in unexpected places. The Danckerts press can function here as a marker in a still undefined field. All in all, it was Danckerts who would publish only in 1680 the first book in the Dutch Republic with almost exclusively technical illustrations: *Architectura chivilis*. To get there the road had been long and winding, prudently moving through the varied genres of the architecture book.

The Danckerts architectural press

The founding father of the renowned Amsterdam family enterprise was Cornelis Danckerts (1604-1656), who operated as an engraver, art dealer, bookseller and publisher of prints

and books⁵. Of his ten children the oldest two sons, Dancker and Justus, followed in his footsteps, while his daughter Anna married Hieronymus Sweerts, another print publisher⁶. In the third generation, Justus' two oldest sons, Theodorus and Cornelis, took over the family business. With respect to the architectural publications of the firm, it is noteworthy that before they entered the printing business the family had prospered in the building trade⁷. Two generations before the first mentioned Cornelis Danckerts, halfway through the sixteenth century, progenitor Cornelis Danckertsz (1536-1595) had held the position of master bricklayer of the city of Amsterdam. The latter's oldest son Cornelis Danckerts de Rij also became master bricklayer of the city, as well as an independent stone mason and architect. The second son, Danckert Cornelisz, specialized in the stone trade and the third son, Hendrick Cornelisz, was bricklayer, stone merchant and clerk of works. Being the son of Danckert Cornelisz, and with a cousin in building who also was called Cornelis Danckerts de Rij, the founder of the publishing house thus came from a milieu that was tried and tested at all levels of the architectural business. He also knew what counted in the then booming city of Amsterdam, both for the architects and builders, and for the wealthy clientele who commissioned their classicist houses along the new canals. He and his relatives knew about construction, ma-



ARCHITECTURA
CHIVILIS
Vertoonende verscheyde Treffelijcke
CAPPEN

*Soo van TOORENS, KERCKE, als mede
veelderhande voorname HUYSSEN, etc
en eenige*

WENTELTRAPPE
*Dienstigh voor alle Lief-hebbers en
Leerlingen van de Bouw-konst.
uyt gegeven*

DOOR
JUSTUS DANCKERS.

T'AMSTERDAM,

*Gedruckt by Justus Danckers Const en Boeck-verkooper inde Calver-
straet by den Dam werden dese Boecken verkost als mede de Architectuer
Boecken van Schamotfi, Pinjola Simon Bosboom, en andere*

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Fig. 1 *Architectura chivilis* vertoonende verscheide treffelijke cappen... cit., engraved title page (Nijmegen, Radboud University, Coll. University Library, shelf mark OD 9 b 30).

Fig. 2 RUSCONI, *Della architettura...* cit., pp. 102-103 (Nijmegen, Radboud University, Coll. University Library, shelf mark OD 408 b 22).

¹ In this article the Netherlands refer to the Southern and Northern Netherlands jointly. Northern Netherlands is used interchangeably with the designation Dutch Republic.

² The interest in the architectural book as an object of study is growing. General surveys include: *The Mark J. Millard Architectural Collection*, I-HV, New York-Washington 1993-2000; A. TAVARES, *The Anatomy of the Architectural Book*, Zurich 2016. On Great Britain, see E. HARRIS, N. SAVAGE, *British Architectural Books and Writers 1556-1785*, Cambridge 1990; on France: F. LEMERLE, Y. PAUWELS, *Architectures de papier. La France et l'Europe, suivi d'une bibliographie des livres d'architecture (XVI-XVII^e siècles)*, Turnhout 2013; on Germany: W. OECHSLIN et al., *Architekturtheorie im deutschsprachigen Kulturraum 1486-1648*, Basel 2018; on the Netherlands: J. GOUDEAU, *Denken in steen, bouwen op papier*, Nijmegen 2016.

³ On Dutch book culture in general, see O.S. LANKHORST, P.G. HOFIJZER, *Drukkers, boekverkopers en lezers in Nederland tijdens de Republiek*, Den Haag 1995; *Bibliopolis*, red. J.A. Bots et al., Zwolle-Den Haag 2003; P.G. HOFIJZER, *The Dutch Republic. Centre of the European Book Trade in the 17th Century*, *European History Online (EGO)*, Mainz, 2015-11-23 (<http://www.ieg-ego.eu/hofijzerp-2015-en>, last accessed on 8 August 2020); A. PETTEGREE, A. DER WEDUWEN, *The Bookshop of the World. Making and Trading Books in the Dutch Golden Age*, New Haven-London 2019.

⁴ Other renowned seventeenth-century publishers on architecture include the Elzevier house and Pieter van der Aa. See *Boekverkopers van Europa*, red. B.P.M. Dongelmans et al., Zutphen 2000; P.G. HOFIJZER, *Pieter van der Aa (1659-1733)*, Hilversum 1999.

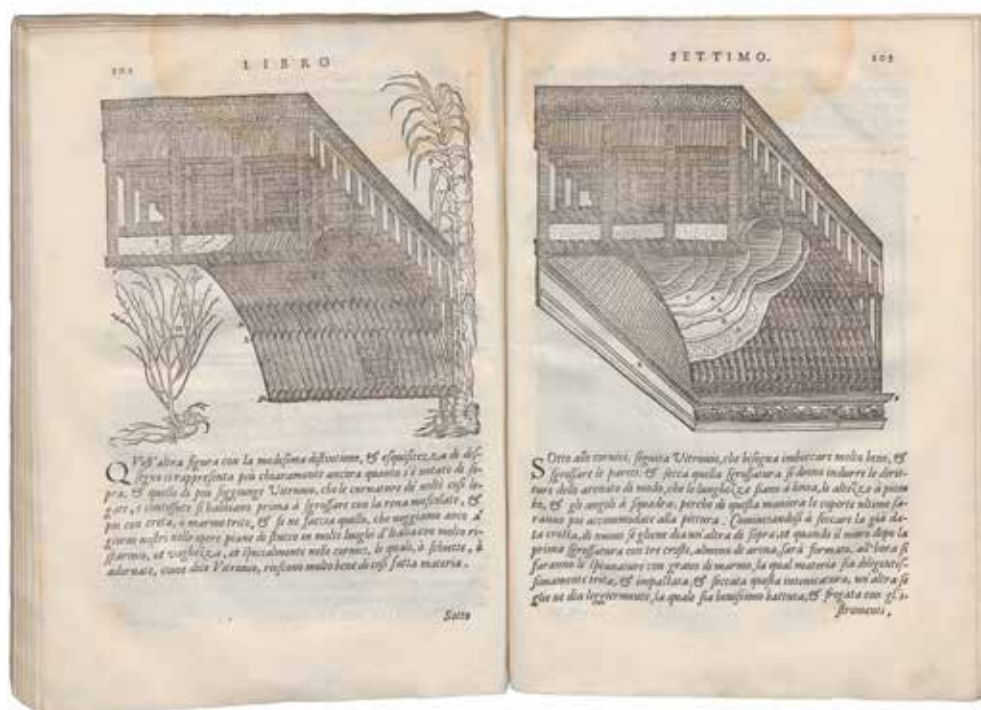
⁵ A more detailed study on the Danckerts press as a whole is desired. Although this article attempts to present the publisher's catalogue on architecture, a definitive list still has to be drawn up. The best account of the publishing house is J. VAN DER VEEN, *Danckerts en Zonen. Prentuitgevers, plaatsnijders en kunstverkopers te Amsterdam, c. 1625-1700*, in *Gedrukt tot Amsterdam*, red. E. Kolfin, J. van der Veen, Zwolle-Amsterdam 2011, pp. 59-119. Archival information in I.H. VAN EEGHEN, *De Amsterdamse boekhandel 1680-1725*, I-III, Amsterdam 1965, passim. On Danckerts as map makers, see G. DANKU, Z. SÜMEGHY, *The Danckerts Atlas. The Production and Chronology of its Maps*, "Imago Mundi", 59, 2007, 1, pp. 43-77.

⁶ I: Cornelis Danckerts (1536-1595), II: Cornelis Danckerts de Rij (1561-1634), Danckert Cornelisz (c. 1580-1618/19), Hendrick Cornelisz (c. 1576-1646/50), III: Cornelis Danckerts (1604-1656), IV: Dancker Danckerts (1634-1666), Justus Danckerts (1635-1701), Anna Danckerts (1641-1672), V: Theodorus Danckerts (1660-1727), Cornelis Danckerts (1664-1717). H.L. KRUIJEL, *Proeve eener genealogie van het uitgestorven geslacht Danckerts (Danckerts de Ry)*, "Nederlandsch Archief voor Genealogie en Heraldiek", 2, 1940, pp. 97-100, 131-136, 145-148, 176-180, 204-209, 250-254, 282, 284; VAN DER VEEN, *Danckerts en Zonen...* cit., p. 60.

⁷ For the Danckerts family and contemporary building, see J.E. ABRAHAMSE, *De grote uitleg van Amsterdam*, Bussum 2010, passim; G. VAN ESSEN, *Het stadsfabrieksambt*, diss., Utrecht University 2011, passim.

⁸ At his death in 1727 Theodorus was declared insolvent and probably that meant also the end of the company. KRUIJEL, *Proeve eener genealogie...* cit., p. 254.

⁹ These publications are referred to below. Though incomplete, the inventory at the death of Dancker Danckerts in 1667 offers an insight into the publisher's catalogue: *Stadsarchief Amsterdam*, SA, notaris D. Danckerts, NA 2852, pp. 691-708, d.d. 2 February and 20 May 1667. Partial transcription in VAN DER VEEN, *Danckerts en Zonen...* cit., pp. 111-115, without the part with (architecture) books (pp. 699-708). With thanks to Jaap van der Veen for sharing information and the exchange of thoughts.



sonry and timberwork, but also about Italian and French taste that brought new aesthetics into building. Architecture was in the genes of the Danckerts family.

The three successive generations of the Danckerts family as printmakers and book publishers would become responsible for a series of highly influential publications on architecture over the course of the seventeenth century. Their publisher's list covers both theory and practice, with authors ranging from one of the first Dutch classicist architects, Salomon de Bray, to the Italian architect and theorist Vincenzo Scamozzi, up to the Swedish engineer Pieter Linperch, bridging a period from about 1630 to 1727⁸. With over thirty different titles, many of them issued in successive editions, Danckerts operated in the heartlands of architectural publishing. If any publisher was to have come up with treatises of a technical character, it should have been Danckerts⁹.

Filling a gap

In the preface to the anonymous *Architectura chivilis* (1680), the editor Justus Danckerts (1635-1701) crisply summarized for his 'benevolent reader' the position of architectural books prior to 1680:

It has to be realized that, for a long time, many outstanding Buildings and Constructions have been erected, of which many significant and praiseworthy books in different languages have appeared for the instruction of the Amateurs of Architecture;

however, to my knowledge, I have never seen until now any printed books on Roofs and Roof construction in our Dutch language [...]¹⁰.

Apart from the fact that in its preface almost every early modern publication recommends itself as new or unique, in this case the prosperous Amsterdam printmaker, publisher, art seller and bookseller had a point. In fact, Danckerts could have been even more precise. The large body of books on architecture had for the most part focussed on the theory of the column orders alone. And it was not only the specific topic of roof construction that was absent in Dutch architectural books: knowledge of building materials and techniques had been almost totally neglected. It is telling in this respect that notwithstanding their fine commercial sense for what would become successful, the Danckerts press itself had until that point also passed over technical treatises and manuals. It is hard to say whether there was no demand at all, or whether the publishers did not dare to take the risk and missed an opportunity here.

This could imply that there was no demand for books on building practice. Traditionally, technical knowledge was communicated orally or in manuscripts. It was handed down by the craftsman to his apprentice, a tradition hard to verify¹¹. Just as in other European countries, in the Northern Netherlands of the late sixteenth and seventeenth centuries, the building trade was confronted with 'new', classical ornaments and with new standards for representative architecture.

With this came an increasingly codified theoretical apparatus that had spread from Italy since the early fifteenth century. For this classical language new theoretical foundations were needed. However, this new *all'antica* architecture did not immediately require a revolutionary new way of construction. Compared to a good many highly complex late-Gothic experiments in construction, in a way the classical building idiom probably curbed the development of building techniques. In any case, the radical changes in taste and design did not require immediate technical innovation in the Netherlands¹².

Almost simultaneously with the rise of classical architectural theory from the south, the sixteenth century met with another, even more revolutionary, invention from the north: the printing press¹³. The interaction between, on the one hand, printing as a vehicle for the transmission of knowledge and ideas and, on the other, the dissemination of the systematic rules of classical architecture seems by now obvious, but is in fact a highly felicitous concurrence of circumstances – a new *medium* for the dissemination of new *ideas* and *classical* texts. Limiting oneself to architectural books, in this emergence of the unseen and unread and the classification of existing theoretical knowledge, building methods and techniques seem to have been disregarded – in publishing then as well as in historiography now.

The non-technical classical standard: Vitruvius and the column orders

In the Netherlands, the trend for architectural books was established in the southern provinces by Pieter Coecke van Aelst (1502-1550), who presented Sebastiano Serlio's fourth book on the use of the classical column orders in an astonishingly beautiful Dutch translation¹⁴. After the first compact volume on the orders in 1539, the two larger Antwerp editions of 1539 and 1549 already show the divergence of theo-

ry and practice that would later pertain to books on architecture. The first of these bore the title *Generale reglen der architecturen* (i.e. general principles of architecture), and the successive edition spoke of *De reglen van metsel-rijen* (i.e. principles of masonry), thus shifting the emphasis from architecture to masonry, and implicitly from the humanist architectural amateur into the domain of craftsmen¹⁵. Coecke's real source was in fact not Vitruvius but Serlio, who had comprised the whole of classical theory: its compelling modular system as a basic design principle for entire buildings, its new idiom and its infinite ornamental possibilities. However, the reference in the extended title to Vitruvius, and with him to his authoritative treatise *De architectura libri decem* from the first century B.C.E., was maintained. In his books Vitruvius had combined theory, construction and material considerations. Nevertheless, it was particularly for his theoretical chapters and theory of the orders and typology that he was referred to¹⁶. That Vitruvius was also valued by some early modern authors for his technical information is proven by Giovanni Antonio Rusconi's *Della architettura* of 1590, in which the fine woodcuts show above all an unrestrained love for *technical and material detail* – a fascinating exception in this genre (fig. 2). This book was known in the Netherlands¹⁷. In this respect the influence on architectural knowledge in the north as a whole of the German translation *Vitruvius Teutsch*, published in Nuremberg in 1548 by the physician Walther Ryff (c. 1500-1548) cannot be overestimated. For the first time, Ryff provided building with a rather sophisticated and permanent terminology that would knit together new theoretical knowledge and building practice. Ryff introduced a professional vocabulary and herewith accomplished for architecture what Georg Agricola (1494-1555) had done for mining and met-

¹⁰ 'Staet dan te betrachten, dat van over langh tot nu toe, seer veel voortreffelijcke Gebouwen en Timmeragien sijn gemaect, waer van veel sinrijcke en zeer dienstige Boecken in verscheyde talen sijn gedrukt en in 't licht gebracht, tot oefeningh van de Liefhebbers der Boukonst; en ick, mijnes wens noch noyt gesien heb in onse Hollantsche tael, eenige boecken van Kap of Dack-werck gedrukt sijn [...]'. *Architectura civilis*, Amsterdam [1680], 'Aen den Discreten Leser', p. [3].

¹¹ J. RYKWERF, *On the Oral Transmission of Architectural Theory*, in *Les traités d'architecture de la Renaissance*, actes du colloque (Tours, 1-11 juillet 1981), éd. J. Guillaume, Paris 1988, pp. 31-48.

¹² This remarkable aspect of seventeenth-century building is still underexposed. On the medieval tradition see: R. MEISCHKE, *Het architectonisch ontwerp in de Nederlanden gedurende de late middeleeuwen en de zestiende eeuw* (1952), in Id., *De gotische bouwtraditie*, Amersfoort 1988, pp. 127-207; M. HURX, *Architecture as Profession. The Origins of Architectural Practice in The Low Countries in the Fifteenth Century*, Turnhout 2017. On the close relationship between technique and the trading of building materials: G. VAN 'TUSSENBOEK, *The Architectural Network of the Van Neurenberg Family in the Low Countries (1480-1640)*, Turnhout 2006.

¹³ M. CARPO, *Architecture in the Age of Printing: Orality, Writing, Typography, and Printed Images in the History of Architectural Theory*, Cambridge 2001.

¹⁴ On Coecke and further documentation see more recently *Unity and Discontinuity: Architectural Relationships between the Southern and Northern Low Countries (1530-1700)*, edited by K. De Jonge, K. Ottenheim, Turnhout 2007, pp. 41-53.

¹⁵ *Die inventie der colommen met haren coronementen ende maten*, Antwerp 1539; *Generale reglen der architecturen op de vyve manieren van edificien*, Antwerp 1539; *Reglen van metsel-rijen, op de vyve manieren van edificien*, Antwerp 1549.

¹⁶ See, among others, S. HOLZER, *Vitruvianismus und Bautechnik. Zur neuzeitlichen Geschichte abgespannter Krankonstruktionen*, "Architectura", 44, 2014, 1, pp. 17-35.

¹⁷ A copy in the Nijmegen University Library: *Della architettura di Gio. Antonio Rusconi*, Venezia 1590; shelf mark OD 408 b 22. Publisher and antiquarian Willem Goeree referred several times to Rusconi in his treatise: *D'Algemeene bouwkunde* [1681], Amsterdam 1705², "Voorbericht"; pp. 23, 103, 119, and 123; 12 and 29.

allurgy¹⁸. It was the orders that would dominate the architectural books, presumably at the cost of the interest in building technique.

Almost a century after Coecke's Serlio excerpt, the situation had not altered much. In 1640 Cornelis Danckerts also looked to Italy for his material. He had noticed the Dutch taste for the work of Vincenzo Scamozzi (1548-1616), the most recent and most comprehensive of Italian treatises¹⁹. With *Grontregulen der bouwconst*, Danckerts established Scamozzi's column system as the standard for Dutch classicist architecture. The popularity of Scamozzi in the Netherlands equalled that of Giacomo Barozzi da Vignola (1507-1573) in France and that of Andrea Palladio (1508-1580) in England. In 1658, Cornelis's son Dancker Danckerts managed to purchase in Venice the original woodblocks of Scamozzi's sixth book on the orders. With an eye on the large Amsterdam city expansions, Dancker Danckerts boosted the popularity of Scamozzi by including the third book on private housing in his 1658 edition in two volumes. The work became an instant success. By 1661, another six different editions had appeared, including a German translation. That these books were widely used in building becomes clear from the fact that the Danckerts editions were adapted and simplified successively by architect Joachem Schuym (fl. 1658-1677), stone mason of the city of Amsterdam Symon Bosboom (1614-1662) and master bricklayer Joost Vermaarsch (fl. 1656-1664) from Leiden. They hired themselves out to Danckerts and to his competitive publishers, resulting in a vying miscellany of more or less analogous Scamozzi editions, each with their own character and adaptations²⁰. These booklets were in fact a hands-on 'technical' application of theory. It was Danckerts, however, who added four new plates to his 1661 edition indicating and listing in Italian and Dutch all the parts of the column orders. With this important list

the architectural terms were codified. The architect Salomon de Bray (1597-1664), who was responsible for this list, changed the still-unsettled Dutch vocabulary into a professional one, just as Ryff had done in German. Danckerts must have tried to capture the market as much as he could by also editing the only Dutch version of Palladio (i.e. the orders from the first book) as well as at least three editions of Vignola, who was especially esteemed by craftsmen for simplifying the correlation between the different orders²¹.

Built examples on paper: topography, buildings, interiors

In 1631, in *Architectura moderna ofte bouwingen van onsen tyt*²² Cornelis Danckerts initiated a tradition of publications on buildings by leading Dutch architects, with an overview of works by the practically-trained master mason of the city of Amsterdam, Hendrick de Keyser (1565-1621). With this book, one of the great craftsmen of its time was embedded in an intellectual narrative. The large format of the engravings and the scholarly introduction by the classicist architect Salomon de Bray set a standard that was only met by Danckerts himself, for example with a second and third reissue of *Gronden en afbeeldsels der voornaamste gebouwen* on the work of the celebrated Amsterdam architect Philips Vingboons (1607-1678)²³. There were representations of important buildings after completion, such as the fine series on the Amsterdam city hall, or the Trippenhuis, the ultimate classicist city palace²⁴. Without there being emphasis on construction or material features or accompanying text, the specialist nevertheless could see on these engravings – mostly consisting of plans, orthogonal elevations and sections – the *constructional details* he wanted to know about. The exact and technical reproduction of the walls, vaults, and roofs was almost casually subsumed in these tantalizingly rich engravings.

¹⁸ W.H. RYFF, *Vitruvius Teutsch* [...], Nuremberg 1548; G. AGRICOLA, *De Re Metallica Libri XII* [...], Basle 1556.

¹⁹ First noticed by J. TERWEN, *Mag de bouwkunst van het Hollands Classicisme "Palladiaans" genoemd worden?*, "Nederlands Kunsthistorisch Jaarboek", 33, 1982, pp. 169-189.

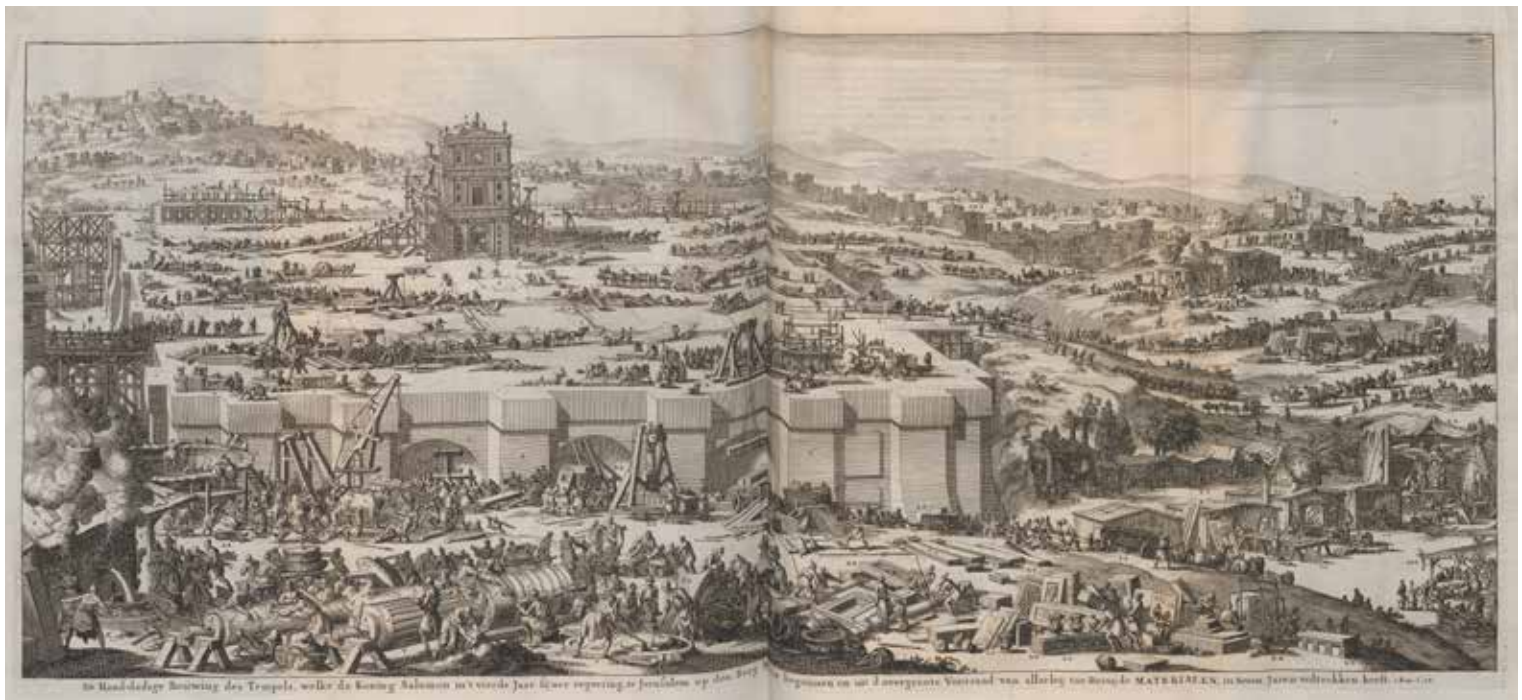
²⁰ For the relationship between these editions, see W. KUYPER, *Dutch Classicist Architecture*, Delft 1980, pp. 225-227; A. HOPKINS, A. WITTE, *Van luxe architectuurtraktat tot praktische handleiding. De Nederlandse uitgaven van Scamozzi's L'Idée della Architettura Universale*, "Bulletin KNOB", 96, 1997, 5, pp. 137-153; P. FUHRING, *Ornament Prints in the Rijksmuseum II. The Seventeenth Century*, I-III, Amsterdam-Rotterdam 2004, passim; V. SCAMOZZI, *De grondgedachte van de universele bouwkunst. Klassieke zuilenorden*, red. M. Dicke et al., Amsterdam 2008, pp. 26-39.

²¹ On Vignola editions in the Netherlands, see R. STENVERT, *Constructing the Past*, diss., Utrecht University 1991, pp. 194-198, 455-460.

²² H. DE KEYSER, *Architectura Moderna ofte Bouwingen van onsen tyt* [...], Amsterdam 1631. Reprint and context in K. OTTENHEYM, P. ROSENBERG, N. SMIT, *Hendrick de Keyser, Architectura Moderna. Moderne bouwkunst in Amsterdam 1600-1625*, Amsterdam 2008.

²³ *Editio princeps* Amsterdam: Joan Blaeu, 1648. The Danckerts editions: Amsterdam: Justus Danckerts, 1680 and 1688, made after the reprint of 1665 of Vingboons' first book.

²⁴ The Amsterdam city hall was designed by architect Jacob Van Campen and built between 1648-1655, only to be finished in 1665. Print series: *Afbeelding van 't Stadt Huys van Amsterdam*. In *dartigh coopere platen, geordineert door Jacob van Campen, en geteeckent door Iacob Vennekool*, Amsterdam 1661. Reprints, all in Amsterdam, by Frederik de Wit [1666-1706], David Mortier 1718, Gerard Valck 1719, Covens & Mortier & Covens Jr [1774-1783]. Architect Justus Vingboons' Trippenhuis in Amsterdam of 1660-1662 was published as: *Het huys van de heeren Louys en Hendrick Trip*, Amsterdam 1664; and reprinted by Justus Danckerts in 1699.



Sometimes, technical information occurs in unlooked-for places. An interesting example, although not by Danckerts, is the two-volume book on biblical 'wisdom' titled *Voor-bereidselen tot de bybelsche wysheid* [...] (Amsterdam 1690). Its publisher and author was bookseller, architectural theorist and biblical antiquarian Willem Goeree (1635-1711)²⁵. In the large engravings of the building of the Temple of Solomon, Goeree incorporates a goldmine of information about building practice (fig. 3). All over this Solomonic building site craftsmen are at work, busy with carpentry, stonecutting, brickmaking, erecting columns, hoisting loads and building elements, roofing, and casting bronze and iron objects. One learns about the ins and outs of work on the construction site, where various trades are involved. In one engraving only, Goeree is able to summarize the whole process of handling raw materials, applying construction techniques, and the use of tools and devices. The ancient setting in fact reflects contemporary building practice, thus providing us in this unexpected context with one of the most comprehensive visual 'catalogues' on building techniques in the Dutch Republic²⁶. The rather isolated example of Goeree in the Dutch Republic would in fact only be complemented by a unique manuscript on practical engineering somewhat later, known as the 'testament' of engineer Adriaan Bommenee, who worked in the province of Zeeland²⁷. In the meantime, the newest domestic classicist architecture, and the private houses along the

canals of Amsterdam in particular, were drawing the attention of the market. Cornelis II Danckerts served its clientele by publishing around 1696-1706 a rare booklet on the canal houses in the new extensions of Amsterdam: twelve plates with rows of house facades, particularly of the Herengracht and Keizersgracht²⁸. Here, architecture was reduced to representative fronts, without indication of its dimensions, ground plans, building material or interiors. There was a hunger for prints of luxurious houses. Danckerts' firm pictured with equal ease villas elsewhere in the country, such as the princely palace at Honselaarsdijk near The Hague. Again, though sometimes very accurate, these prints had more to do with status and court culture than with documenting architecture as such.

The Italian taste came 'filtered' to the market. In 1630, in Cornelis Dankerts' first architectural publication, *Architecture van verscheidene nieuwe poorten; of deuren van huizen*, an unknown author H.K. presented a series of classicist Italian entrance gates, adapted to the more sober Dutch taste, without any ornament or sculpture²⁹. A later seventeenth-century less direct route was through French domestic architecture, which matched the taste and needs of the nobility around the stadtholder (Frederik Henry, William III) and the new mercantile elite in the Republic. The designs of chimneypieces made up the largest part of the publications, reprints from works by the French designer and engraver Jean and his son and ar-

Fig. 3 GOEREE, *Voor-bereidselen tot de bybelsche wysheid*... cit., p. 1594 (Nijmegen, Radboud University, Coll. University Library, shelf mark OD 268 B 58).

²⁵ CH. VAN DEN HEUVEL, Willem Goeree (1635-1711) en de ontwikkeling van een algemene architectuurtheorie in de Nederlanden, "Bulletin KNOB", 96, 1997, 5, pp. 154-176.

²⁶ In a way, the materials and tooling displayed on this engraving are complemented by the passages on building materials in his later architectural treatise W. GOEREE, *D'Algemeene bouwkunde*, Amsterdam 1681.

²⁷ Het 'testament' van Adriaan Bommenee. *Praktijkervaringen van een Veerse bouw- en waterbouwkundige uit de 18^e eeuw*, Middelburg 1988.

²⁸ Een Amsterdams grachtenboekje uit de zeventiende eeuw, red. I.H. van Eeghen, Amsterdam 1963.

²⁹ The initials 'H.K.' probably are of Hendrick Cramer (Kramer). See KUYPER, *Dutch Classicist Architecture*... cit., pp. 227, 326.

chitect Pierre Le Pautre, such as *Nouveaux desseins de cheminées à l'italienne* and *Nouveau livre d' porte d' la chambre* (Amsterdam 1700, resp. 1751) and by the architect Pierre Bullet, e.g. *Verschyde schoorsteen mantels [...]* (Amsterdam 1675-1686). When the focus of his clientele shifted to the home interior, Danckerts capitalized on this tendency in 1646 with *Verhandeling van galderyen, voor-huizen, zaelen [...]*, an adaptation of the famous *Manière de bâtir* (Paris 1623) by Pierre Le Muet, who in his turn had been inspired by Sebastiano Serlio. The constructional and material specifications of all this architecture, however, remained implicit, if not completely absent, as before. These examples seem to indicate that seventeenth-century building techniques were favourably communicated without words and only *visually* through illustrations – sometimes isolated and in all types of publications.

The ultimate early technical treatise: military architecture

With its publishing policy the Danckerts press must have aimed at both the educated architect and the wealthy citizenry and aristocracy. Yet, there was one large field in the publishing of books on building that was more exclusively the arena of the engineer: fortification. The many treatises on fortification are the most technical of all publications on architecture, dealing with *mathematical operations*, land surveying, the construction of fortifications and the tactics of siege warfare, presented as a matter of calculation and geometry. The practical tricks of the trade, however, such as drainage, earth moving and examining geographical conditions remained mostly outside the scope of these treatises. In this case the Danckerts press made no attempt to gain a foothold in this book genre and most likely left it for specialized publishers such as Elsevier (Leiden and Amsterdam), who were

in close contact with the engineers. Nonetheless, Danckerts did try to take some advantage of the wide interest in fortification. Around 1696 the house published a series of sheets called *Fortesse van [...]*, displaying fortified cities all over Europe and the Mediterranean. Examples from Sicily, Lombardy, the Rhine region, the Spanish Netherlands or the Peloponnesian peninsula served purely illustrative purposes in the wake of the many evocative siege accounts that were published³⁰. With hindsight it is curious that all these books on fortification with their *technical character* had no effect on the writings on civil architecture. Yet the multitasking Simon Stevin (1548-1620) had by the early seventeenth century tried to cover both fields with an equal practical attention³¹. His pioneering approach remained an exception throughout the seventeenth century.

Mechanical vistas: gardens and perspective

The expertise of the engineer and land surveyor stretched far beyond fortification alone. Wherever these men were recruited, they were also acquired for all sorts of civil engineering, as city planners, experts in hydraulics, fireworks, and, in the distant colonies, for house building too. Some of them specialized in landscape and garden architecture. Strangely enough, in books on garden ornaments, significantly more attention was given to technical *realization* than in books on civil architecture. One of the first was Salomon de Caus in his fantastic *Les raisons des forces mouvantes [...]* (3 vols., Frankfurt: Jan Norton, 1615). In the case of garden design, the Dutch fascination for gardens had its origin in the French formal garden. The fabulous fable fountains by Charles Perrault in the labyrinth of Versailles became popular all over Europe, particularly thanks to a modest Dutch reprint of the original French publication, this time expanded with texts in French, English, Ger-

³⁰ See M. POLLAK, *Cities at War in Early Modern Europe*, Cambridge 2010; J. GOUDEAU, *Safe Strongholds. Mathematical Fortification and the Fortress of Mathematics*, in *Festungsbau. Geometrie – Technologie – Sublimierung*, herausgegeben von B. Marten, U. Reinisch, M. Korey, Berlin 2012, pp. 219-235.

³¹ CH. VAN DEN HEUVEL, 'De Huyssbou'. A Reconstruction of an Unfinished Treatise on Architecture, Town Planning and Civil Engineering by Simon Stevin, Amsterdam 2005.

man and Dutch³². The specifications of the advanced technique behind these colourful fountains that ‘spoke’ with their water jets remained untold. Here in the books and prints of garden architecture it was not the, sometimes remarkable, technique that played a role, but the ornamental function of the gardens or compact narrative of the symbolic universe that was displayed in them. At the turn of the century, Justus Danckerts added to his catalogue a series of French garden trellises by Jean and Pierre Le Pautre³³. Of course, there were exceptions where technique did play the main role, such as the small book *Berigt om konstige lugt en waterwerken te maaken [...]* by an anonymous author indicated as D.R. Ph.Dr. (Utrecht: Joannes Evelt, 1735)³⁴. This booklet contains a compilation of fanciful fountains with their *pneumatics and hydraulics*, comparable with De Caus’s earlier fascination.

Frequently the attractiveness of the luxurious country estates in prints is largely determined by the use of enhanced perspective. Books on the working and correct construction of perspective became popular, both for the education of the professional artist and architect and for the instruction of amateurs. Perspective was a standard part of books on mathematics. Danckerts contributed with two key publications on ‘doorsicht-kunde’ (‘the art of viewing’), Dutch translations of books by Abraham Bosse, who in turn had borrowed the method from Girard Desargues³⁵. Technique here was *drawing technique*.

Early traces: the roofs and stairs of *Architectura chivilis* (c. 1680)

In an attempt to find out when building technique first appeared in Dutch architectural books, the above brief overview has shown how new architectural knowledge entered the Republic directly or indirectly. It becomes clear that

these publications contributed only to a very limited extent to the spread of knowledge on building technique. The technical aspect of architectural theory in the Netherlands was limited to mathematics. What was called *mechanics*, was in fact statics, followed by analytic mathematics. In France and England techniques were taught at the Académie and the Royal Society respectively, whereas the Netherlands lacked such permanent institutions³⁶. A typical architectural problem since the late sixteenth century had been the advancement of stereotomy or stonecutting, which affected both the design of stone staircases and vaulting. Building in the Northern Netherlands meant mostly masonry, with mature techniques that had already developed in the Gothic period³⁷. Although stereotomy was not unknown in the Republic, it is not reflected in Dutch architectural books.

The subject of building in wood, however, did abound in the print medium. A key publication in this respect was brought to the market around 1680 by Justus Danckerts: *Architectura chivilis, Vertoonende verscheide treffelijke cappen [...]*³⁸ (fig. 1). This modest folio on civil architecture with thirty-nine engravings has escaped attention in architectural history, but it is actually the first publication in Dutch on building technique and is a milestone in architectural publication in the Republic³⁹. The engraved title page catches the eye, being an adaptation of the frontispiece by Salomon Savery (1594-1683) for Joost van den Vondel’s famous poem on the inauguration of the Amsterdam town hall: *Inwydinge van ‘t Stadthuis t’Amsterdam* (Amsterdam: Widow of Abraham de Wees, 1655). Danckerts copied the general layout and main iconography, with the personification of *Architectura* (reflecting the title of the book). In her right hand she holds a compass, square and plumb line, and in her left, a model of the town hall of Amsterdam, thus mirroring the title page of the *Inwydinge*. The cross-

³² CH. PERRAULT, [...] ‘t Dool-hof tot Versailles, Amsterdam [1682].

³³ Undated, c. 1675-1686; reprint by Reinier & Josua Ottens c. 1726-1750 or 1750-1765; FUHRING, *Ornament Prints...* cit., cat. nos. 7350-7354.

³⁴ A unique copy in the Nijmegen University Library: shelf mark OD 330 c 109.

³⁵ G. DESARGUES, A. BOSSE, *Algemeene manier van de hr Desargues tot de praktyk der perspectiven [...]*, Amsterdam 1664, and Justus Danckerts 1686; A. BOSSE, *Algemeen middel tot de practijck der doorsicht-kunde op tafereelen [...]*, Amsterdam 1686.

³⁶ J. HEYMAN, *Geometry, Mechanics, and Analysis in Architecture*, in *Geometrical Objects. Architecture and the Mathematical Sciences 1400-1800*, edited by A. Gerbino, Cham 2014, pp. 193-201. Of course, there was the famous seventeenth-century Dutch engineering school *Duytsche Mathematique* in Leiden as well as others for studying fortification and practical mathematics, but these lacked a theoretical reflection and as institutions did not contribute to mathematical developments as such. Older, but still most relevant are: E. TAVERNE, *In ‘t land van belofte: in de nieuwe stadt. Ideaal en werkelijkheid van de stadsuitleg in de Republiek 1580-1680*, Maarssen 1978; P.J. VAN WINTER, *Hoger beroepsonderwijs avant-la-lettre. Bemoeiingen met de vorming van landmeters en ingenieurs bij de Nederlandse universiteiten van de 17^{de} en 18^{de} eeuw*, Amsterdam-Oxford-New York 1988. On the mathematization in Dutch architectural theory: J. GOUDEAU, *Nicolaus Goldmann (1611-1665) en de wiskundige architectuurwetenschap*, Groningen 2005.

³⁷ For mediaeval style and praxis in the Renaissance, see E.M. KAVALER, *Renaissance Gothic*, New Haven-London 2012.

³⁸ *Architectura chivilis vertoonende verscheide treffelijke cappen soo van toorens, kercke, als mede veelderhande voornamen huysen, etc en eenige wenteltrappe: dienstigh voor alle lief-hebbers en leerlingen van de bouw-konst*, Amsterdam s.a. [c. 1680]. Engravings numbered 9-43; figs. 1-4. A second undated edition (on the title page next to Justus Danckerts’ name ‘cum privilegio’ added) was probably issued c. 1686 or later, and a third c. 1750 by Reinier & Josua Ottens in Amsterdam. Cf. editions in the University Libraries of Amsterdam and Nijmegen and in the collection of the Rijksmuseum Amsterdam. FUHRING, *Ornament Prints...* cit., cat. nos. 5112-5151; 5152-5191. An extra print of the interior of the old Lutheran church in Amsterdam (1633) is found in all three editions, though not in all the copies and in a different format.

³⁹ GOUDEAU, *Denken in steen...* cit., p. 86.

Fig. 4 WILHELM, *Architectura Civilis... cit.*, engraved title page (München, Bayerische Staatsbibliothek; Europeana Collections).



staff (an instrument for navigation, referring to the Amsterdam sea trade) is copied, whereas several other craftsman's tools are added. The title page clearly tried to seduce the reader, without giving anything away of the unusual contents of the book itself. As mentioned above, Danckerts promised to treat remarkable *roof constructions*, many of which, he writes in his preface, had been destroyed by acts of war. Although the Republic had known its own Eighty Years' War, this remark gives a clue to the real provenance of his material.

The war referred to was the Thirty Years' War (1618-1648) that had brutally ravaged the Ger-

man countries. Danckerts' book turns out to have indeed an undisclosed German source⁴⁰. Though without citing it directly, the book can be traced back to the equally unique book on roof construction *Architectura civilis: das ist Beschreib- oder Vorreißung der fürnembsten Tachwerck [...]* by master builder Johann Wilhelm (1595-after 1669) from Frankfurt am Main⁴¹. First published by the author in Frankfurt in 1649, a year after the Peace of Westphalia, this book became a handbook and ran to six editions⁴² (fig. 4⁴³). Danckerts copied (thus printed mirror images of) twenty of the thirty-eight original illustrations by the Frankfurt artist Sebastian

⁴⁰ As in all other fields of publication, of architectural books and prints, foreign and domestic, rights were sold, copies, translations and excerpts were issued, simultaneously struggling against a lively market of counterfeits and pirate editions. How Danckerts acquired this title is unknown.

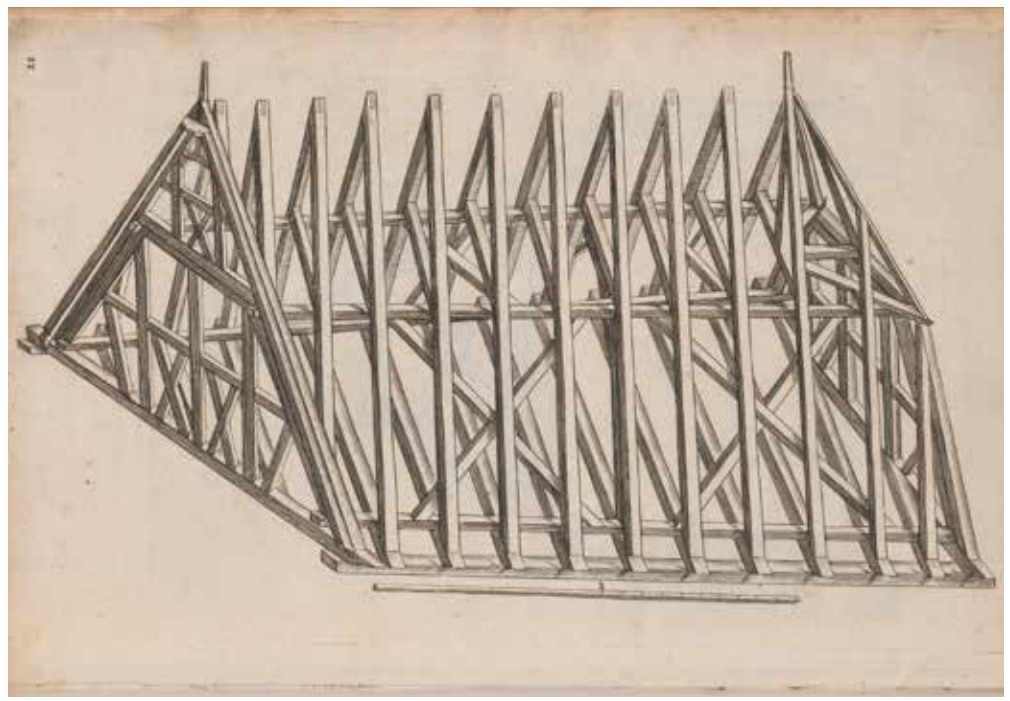
⁴¹ J. WILHELM, *Architectura civilis das ist: Beschreib- oder Vorreißung der fürnembsten Tachwerck, nemlich hoher Helmen, Creutztächer, Wiederkehrungen, Welscher Hauben, so dann Kelter, Pressen, Schnecken, oder Windelstiegen, vnd dergleichen*, Frankfurt am Main 1649. FUHRING, *Ornament Prints...* cit., cat. nos. 5401-5471.

⁴² Frankfurt am Main: with the author, 1654, 1662; a second part added: Nuremberg: (widow of) Paul Fürst c. 1668, c. 1675; Rudolf Johann Helmers 1705.

⁴³ J. WILHELM, *Architectura Civilis [...]*, Frankfurt am Main 1662, in Europeana Collections: <http://mdz-nbn-resolving.org/urn:nbn:de:bvb:12-bsb11053805-1>, last accessed on 8 August 2020.



Furck (1589/98-1655/66), likely from the 1662 edition. He adapted the preface only slightly. The engravings, showing different and in some cases rather unusual roof types, tower constructions, wooden vaults, and two spiral staircases, had to speak for themselves, with only a very short introduction. It is highly doubtful that the examples in the book fitted the Dutch context and apparently those engravings that were too 'German' because of their specific and deviant wood constructions were left out⁴⁴. Danckerts replaced them with examples from other sources, of which the most remarkable is the engraving of the famous (later added) tower construction of the Maastricht town hall (fig. 5). Other illustrations are taken from the French Palladio edition by Pierre Le Muet, *Traicté des cinq ordres d'architecture [...] Traduit du Palladio [...] Augmenté de Nouvelles inventions pour l'art de bien bastir par le Sr. Le Muet* (Paris: François Langlois, 1645, or a later edition). Earlier, Cornelis Danckerts had used this edition for his own Dutch Palladio edition. These sections of houses and roof constructions were not Palladio's, of course, but the work of the French architect Le Muet, and they suited the Dutch context better. Some stone bridges at city gates depicted by Wilhelm were left out by Danckerts. He replaced them with three engravings of wooden drawbridges, taken from two typical Dutch books on fortification by Adam Freitag (1608-1650) and Nicolaus Goldmann (1611-1665)⁴⁵. The models of spiral stairs were also new. The real impor-



tance of this somewhat hybrid book lies probably not so much in its content as in the presentation and details which would become standard in later technical manuals: the startling oblique projection of complex roof constructions, the construction lines revealing the proportions and underlying geometry, the consequent scales, and the accurate rendering of joints (fig. 6). Thus, this book formed the pinnacle, so far, of an architectural book on *building technique*, in which different developments came together. It combined the exclusive focus on building construction, the transmission of knowledge from abroad through built examples, the application of carefully arranged projection with a technical purpose by avoiding perspectival foreshortening, and the illustrations accompanied by a short explanatory text using a technical vocabulary. With both the seductive engravings and the symbolically charged title page Danckerts inserted the publication smoothly into the existing context of the familiar architectural book.

A new angle: the German tradition and a Dutch roundabout route

The connection between German and Dutch books on building technique is more complex than Justus Danckerts borrowing from Johann Wilhelm. It even seems that from the last quarter of the seventeenth century on, there emerged a German-Dutch exchange of knowledge, resulting in the rise of the technical treatise in both countries. Earlier, Dürer, Agricola-

Fig. 5 *Architectura chivilis... cit.*, tab. 26 (Nijmegen, Radboud University, Coll. University Library, shelf mark OD 9 b 30).

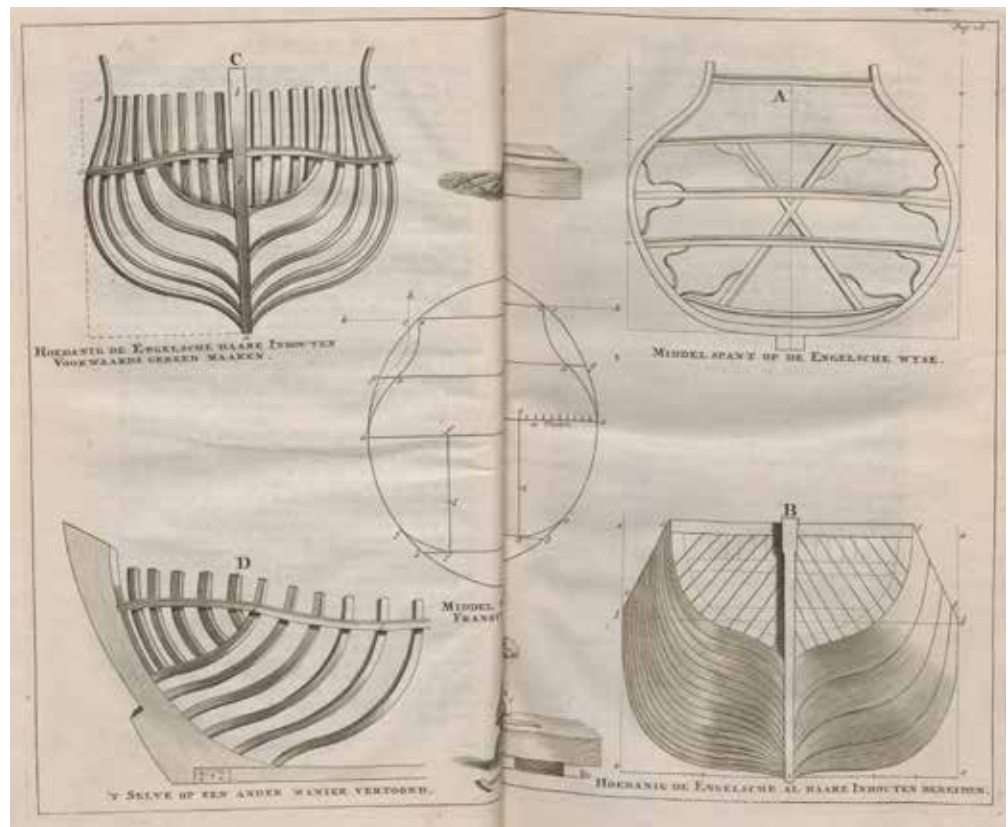
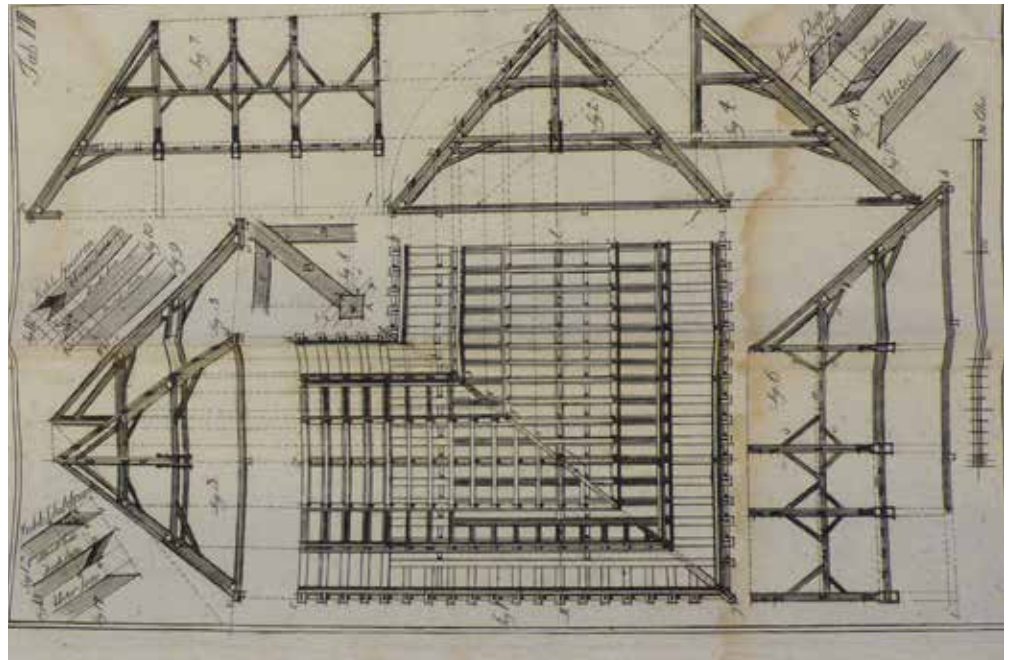
Fig. 6 *Architectura chivilis... cit.*, tab. 11 (Nijmegen, Radboud University, Coll. University Library, shelf mark OD 9 b 30).

⁴⁴ Compare with H. JANSE, *Houten kappen in Nederland 1000-1940*, Delft-Zeist 1989, part 3; S. HOLZER, B. KÖCK, *Structure of Baroque Church Roofs in Bavaria*, in *Structural Analysis of Historic Construction*, edited by D. D'Ayala, E. Fodde, I-II, Bath 2008, pp. 235-242.

⁴⁵ J. GOUDEAU, *Freitag, Adam (1602-1664)*, and: ID., *Goldmann, Nicolaus (1611-1665)*, in *Architectura. Les livres d'architecture*, éd. F. Lemerle, Y. Pauwels, Tours 2015; <http://architectura.cesr.univ-tours.fr/traite/Auteur/Freitag.asp?param=en>; and: <http://architectura.cesr.univ-tours.fr/traite/Auteur/Goldmann.asp?param=en>, last accessed on 8 August 2020. Note that these books were not published by Danckerts but by Elsevier.

Fig. 7 REUSS, *Anweisung zur Zimmermannskunst... cit.*, tab. VII (Tilburg, University, Coll. University Library, shelf mark CBC TFK D 590).

Fig. 8 VAN YK, *De Nederlandsche scheeps-bouw-konst open gestelt... cit.*, p. 18 (Nijmegen, Radboud University, Coll. University Library, shelf mark OD 165 b 7).



la, Ryff and De Caus had dealt with technical problems and mechanics. Seventeenth-century writers on building, then, became almost entirely absorbed with the mathematical approach, dealing with architecture and design *more geometrico*. Mechanical phenomena were primarily treated as wonders of nature. From the early eighteenth century on, the architectural publicists Leonhard Christoph Sturm (1669-1719) and Johann Jacob Schübler (1689-1741) engaged in two new genres: wooden con-

structions and industrial architecture, including roofs, bridges, sluices, and mills. As the titles of their works reveal, Sturm and Schübler based their general theory on the architectural theorist Nicolaus Goldmann (1611-1665) who worked and taught in the Dutch town of Leiden. Danckerts took engravings for his *Architectura chivilis* from Goldmann. Sturm's father, Johann Christoph, had studied with Goldmann and Leonhard Christoph himself had travelled through the Netherlands. That was where he be-



Fig. 9 LINPERCH, *Architectura mechanica... cit.* (1700), engraved title page (rare copy sold by Zwiggelaar Auctions, Amsterdam 2018).

came fascinated by the theoretically neglected works of engineering, to which he would dedicate various books that set a standard in the field⁴⁶. The Nuremberg draughtsman and engraver Schübler must have been well aware of Wilhelm's work, as is evident from his *Nützliche Anweisungen zur [...] Zimmermans-Kunst* and his *Sciagraphia artis tigniariae [...] Zimmermannskunst* (Nuremberg: Joh. Christoph Weigel, 1731, resp. 1736). These books were lavishly illustrated with very detailed prints, for example,

of roof constructions. The line started by Wilhelm and Schübler was continued throughout the eighteenth century in Germany. A fine example in this respect is the rare book *Anweisung zur Zimmermannskunst* (Leipzig: Bernhard Christoph Breitkopf and Johann Breitkopf, 1764), by the royal architect of Saxony in Dresden Christian Gottlob Reuss (1716-1792)⁴⁷ (fig. 7). In twelve chapters of text, illustrated by thirty large fold-out engravings, Reuss gives detailed descriptions of the construction of roofs. He uses

⁴⁶ Relevant titles by Leonhard Christoph Sturm: *Von Häng- oder Sprengwerken* (1713), *Fang-Schläussen* (1715), *Mühlen Baukunst* (1717), *Reise-Anmerckungen* (1719), *Wasser-Künste* (1720), *Schiff-Häuser* (1721). Most of these books posthumously compiled in *Der auserleßteste [...] Goldmann [...]*, Augsburg 1721, in which twenty-two of his works on civil architecture. See GOUDEAU, *Nicolaus Goldmann... cit.*, app. 4.

⁴⁷ Only remaining copy in the Netherlands: Tilburg University Library, shelf mark CBC TFK D 590.

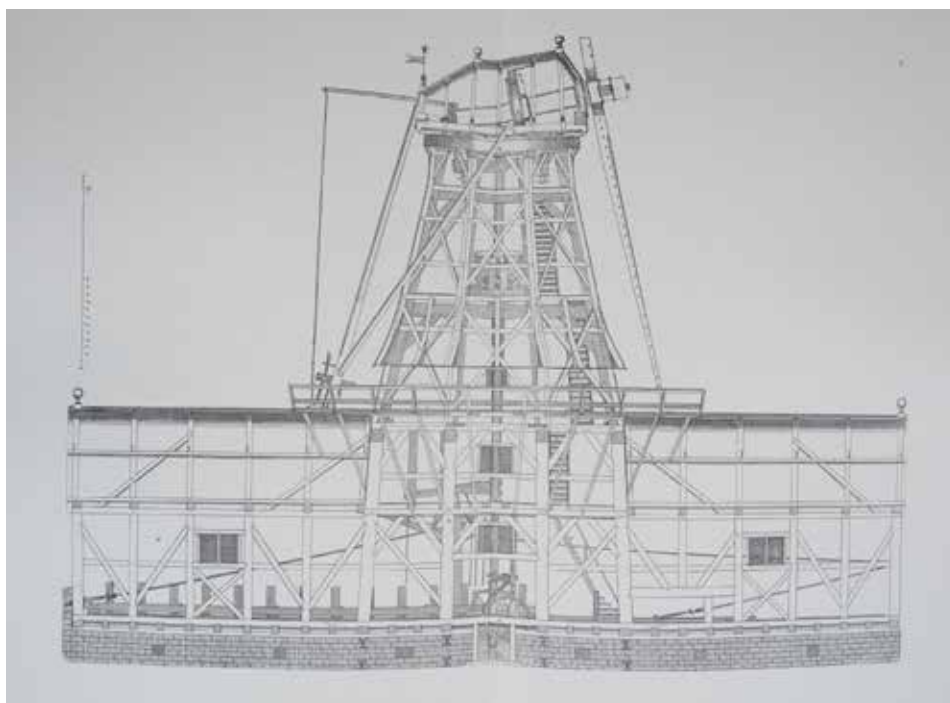
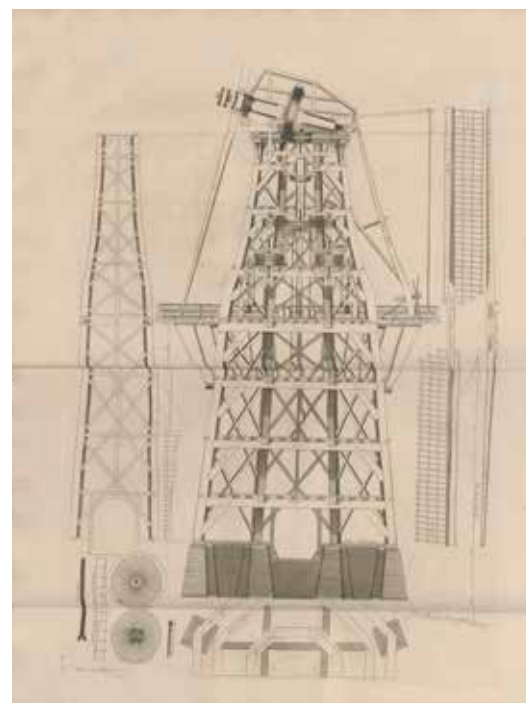


Fig. 10 LINPERCH, *Architectura mechanica...* cit. (1725), tab. 8 (Amsterdam, University, Coll. University Library, shelf mark OTM: OF 80-142)

Fig. 11 VAN NATRUS, POLLEY, VAN VUUREN, *Groot volkomen moolenboek...* cit., part 2, tab. V-VI (engravings by J. Punt; Nijmegen, Radboud University, Coll. University Library, shelf mark OD Kluis).



professional terms for the different beams, trusses, tie-beams, spars, and braces. He also pays minute attention to the specific joints by which the parts of the roof are assembled. During the eighteenth century, these and similar technical books made headway in the academies and practical architectural education in northern Europe, a tradition that started with Wilhelm and Danckerts.

Technique gets a foothold: mills, sluices, stairs, and roofs

The legacy of Justus Danckerts' *Architectura chivilis* in the Northern Netherlands was the emergence of a lasting genre of books on building technique. The Amsterdam architect and teacher Adrianus Erzey (1719-1777) used material from this work for his own *Architectura of bouw-konst* [...], [Amsterdam: s.n., 1777]⁴⁸. In the early nineteenth century, the Amsterdam architect Johannes van Straaten (1781-1858) reworked Danckerts' material on the construction of stairs, this being originally seventeenth-century material, in *Nieuwe verbeterde bouwkunde van A. Erzey* [...] (Amsterdam: Simon de Grebber, 1829). In this rather silent way print began to complement the traditional way of dealing with technical problems by best practice and rules of thumb, solutions handed down by education on site, in manuscripts, notebooks, drawings, and scale models. Occasionally practical knowledge had found its way into print, as in the book on the typical Dutch craftsmanship involved in ship-

building written by the specialist Cornelis van Yk, *De Nederlandsche scheeps-bouw-konst open gestelt* [...] (Delft and Amsterdam: Andries Voorstad voor Jan ten Hoorn, 1697). It shows, above all, the construction and dimensions of ribs for different types of ships (fig. 8). This became one of the first printed books to openly share this kind of specialist information normally kept hidden⁴⁹. Yet, by the turn of the century the tide had turned permanently⁵⁰. The Danckerts house was quick to serve a new audience of educated builders and the upcoming class of civil engineers. Around 1700, Justus Danckerts came up with *Architectura mechanica, of Moole-boek van eenige opstellen van moolens, nevens hare gronden* [...], containing a series of thirty-two detailed and accurate prints of wind-, water-, and horse mills, five of them in Holland, and six in Copenhagen and Stockholm⁵¹ (fig. 9). For this book Justus partnered with the experienced millwright and draughtsman Pieter Linperch (also Pehr Lindberg) from Stockholm. It is a curious fact that initially Dutch windmill technology had found its way north, so the Scandinavian examples also had Dutch roots⁵². The preface of the book explains that Linperch had travelled to the Netherlands in order to study the Dutch windmills on site. Before going back, he gave proof of the knowledge he had gathered, particularly using examples from Amsterdam and the Zaanstreek, the by then already highly 'industrialized' region along the Zaan river. The mills were for grinding barley and corn, oil pressing, and sawing trees

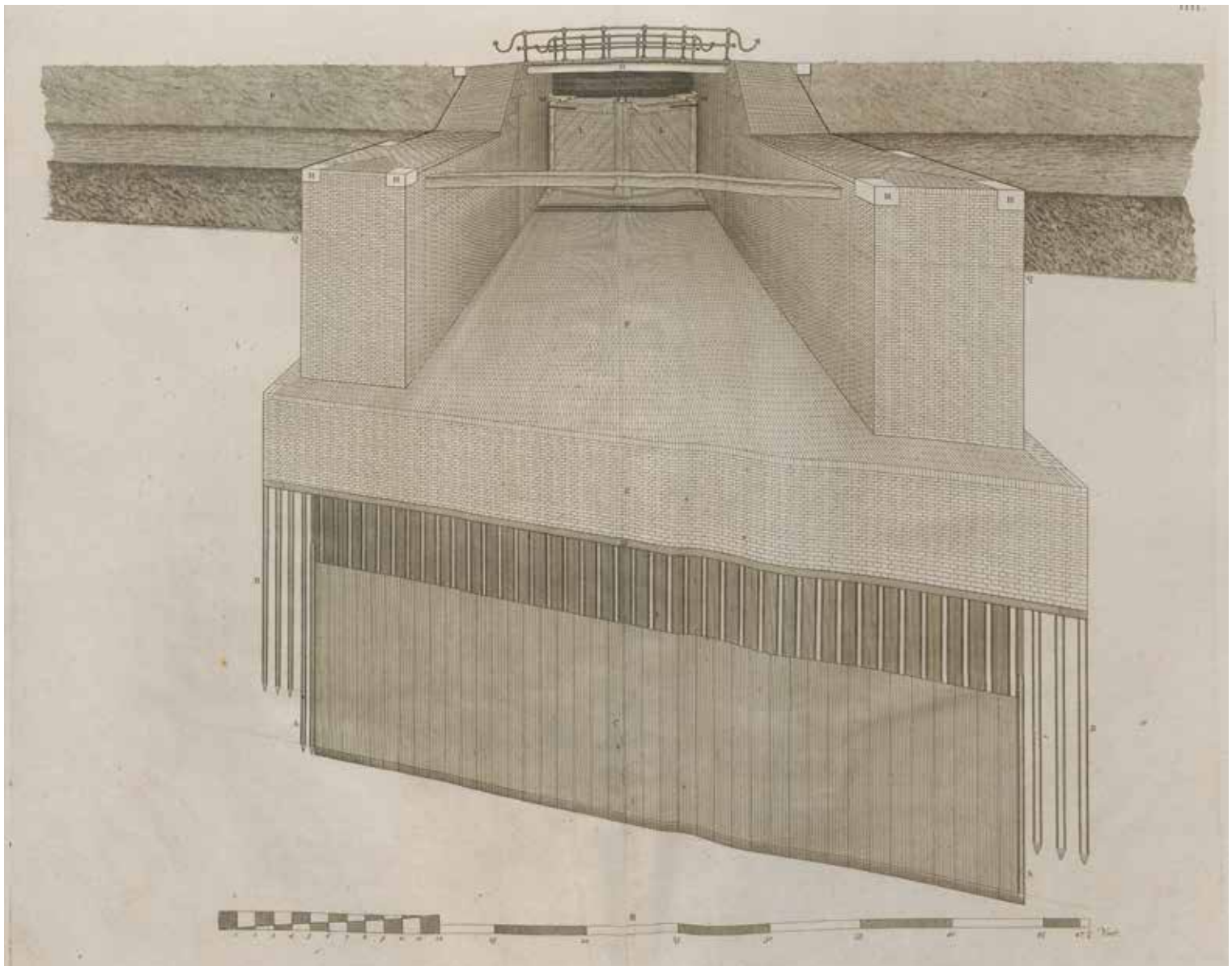
⁴⁸ Some remarks in D. DE VRIES, *Kapconstructies uit de 18de eeuw: stilstand of vernieuwing?*, "Bulletin KNOB", 107, 2008, 5-6, pp. 224-232.

⁴⁹ Although naval architecture in early modern theory was sometimes regarded as a full branch of architecture, it was in practice a separate discipline. Contemporary with Van Yk: N. WITSEN, *Architectura Navalis* [...], Amsterdam 1690. See also M. PETERS, *De wijze Koopman*, Amsterdam 2010, pp. 151-167; D. MCGEE, *Ships, Science and the Three Traditions of Early Modern Design*, in *The Power of Images in Early Modern Science*, edited by W. Lefèvre et al., Basle-Boston 2003, pp. 28-46; Nicolaes Witsen and *Shipbuilding in the Dutch Golden Age*, edited by A.J. Hoving et al., College Station 2012.

⁵⁰ The emergence of this new architectural book genre seems to be in step with a broader development sketched by Davids, who argues that Dutch technology became a successful export product just when the Republic as a world power was on its way back. C.A. DAVIDS, *The Rise and Decline of Dutch Technological Leadership*, HI, Leiden 2008.

⁵¹ First edition before 1700, printed by Justus' son Cornelis (the date 1686 cannot be verified); reissue in 1725 by his other son Theodorus; third print in Amsterdam in 1727 by Johannes Covens & Cornelis Mortier.

⁵² C.A. DAVIDS, *The Transfer of Windmill Technology from the Netherlands to north-eastern Europe from the 16th to the early 19th Century*, in *Baltic Affairs*, edited by J. Lemmink, J. van Koningbrugge, Nijmegen 1990, pp. 33-52.



into beams and planks. It is likely that this folio with its large prints, drawn to scale and showing *in plano* sections, plans and installations, is the earliest Dutch specialist book on windmills. It surely is of high standard, both in respect of its illustrations and in the short description of the buildings' parts and measurements (fig. 10).

By 1734, the book seems to have been overtaken by the *Groot algemeen moolen-boek* [...] which remains somewhat hidden behind its main title *Theatrum machinarum universale*. The author is Johannes van Zyl, a millwright from Lexmond near Utrecht and the publisher is Pieter (II) Schenk (1693-1775) in Amsterdam⁵³. Published simultaneously, and closely related to this, is the *Groot volkomen moolen-boek, of Naauwkeurig ontwerp van allerhande tot nog toe bekende soorten van moolens* [...] of 1734-1736. It consists of two volumes with drawings by Leendert van Natrus (chief mill-

wright of the East India Company in Amsterdam), Jacob Polley (millwright at Zaandam), and Cornelis van Vuuren. These were engraved by the multitalented Jan Punt (1711-1779)⁵⁴ (fig. 11). Remarkably enough, Covens & Mortier, the publishers of this last book, also had Danckerts' Linperch book reprinted in 1727, as a prelude to Van Natrus.

The books on mills must have initiated an interest in high quality books on engineering works. Pieter Schenk planned a more encyclopaedic series of technical treatises under the already mentioned umbrella title *Theatrum machinarum universale*, most likely inspired by a comparable initiative by the German scientist Jacob Leupold (1674-1727). The series as a whole stands out for its quality of engravings and the professionalism of the descriptions, which raised Linperch's work to a new level. The book on mills by Van Zyl was followed by a two-vol-

Fig. 12 VAN DER HORST, *Theatrum machinarum...* cit. (1757-1774), part II, extra tab. IIII (Nijmegen, Radboud University, Coll. University Library, shelf mark OD 46 a 3).

⁵³ Two parts. Simultaneously an octavo edition without illustrations, including *Nieuwe beschrijving* [...] (21 pages and 6 tables). Later folio editions, engraved by Jan Schenk, published by Pieter Schenk in 1761 and c. 1780. Undated German translation by Pieter Schenk in Leipzig.

⁵⁴ Engravings nos. I: 1-27; II: 1-27, 28-32.

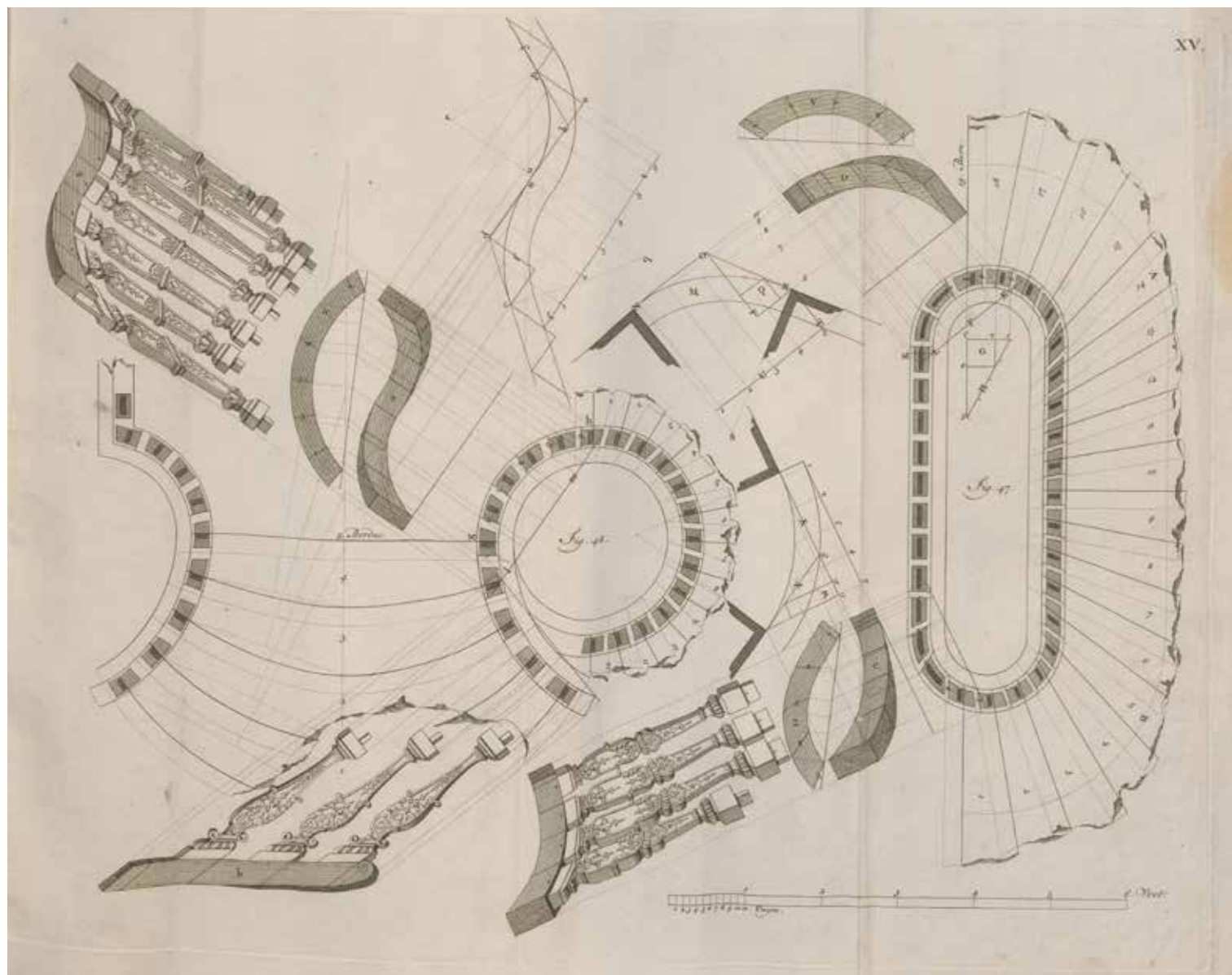


Fig. 13 VAN DER HORST, *Theatrum machinarum*... cit. (1739), pl. XV (Nijmegen, Radboud University, Coll. University Library, shelf mark OD 60 a 1).

ume publication on Dutch waterworks, sluices, dams, and bridges by the well-informed Tieleman van der Horst and the abovementioned Jacob Polley, with Jan Schenk (1698-1752) as the engraver: [...] *Keurige verzameling van [...] waterwerken, schutsluizen, waterkeringen, ophaal- en draaibruggen* [...] (Amsterdam: P. Schenk, 1736-1737)⁵⁵ (fig. 12). In the third book in the series, Tieleman van der Horst presented in 1739 a lavish work on wooden stairs: [...] *Nieuwe algemeene bouwkunde [...] veeleerley soorten van trappen* [...] ⁵⁶ (fig. 13). This is still one of the finest books on the subject. A fourth book by Jacob Polley deals with roofs: *Architectura civilis, of naauwkeurige ontwerpen en verzamelingen van verscheide zeer fraaye groote kap-werken* [...] (Amsterdam: P. Schenk, 1770)⁵⁷ (fig. 14). Now, with the stairs and roofs, the circle was closed. These books took up the two oldest technical topics in the Netherlands

– introduced in Danckerts' *Architectura civilis* of 1680.

Conclusion

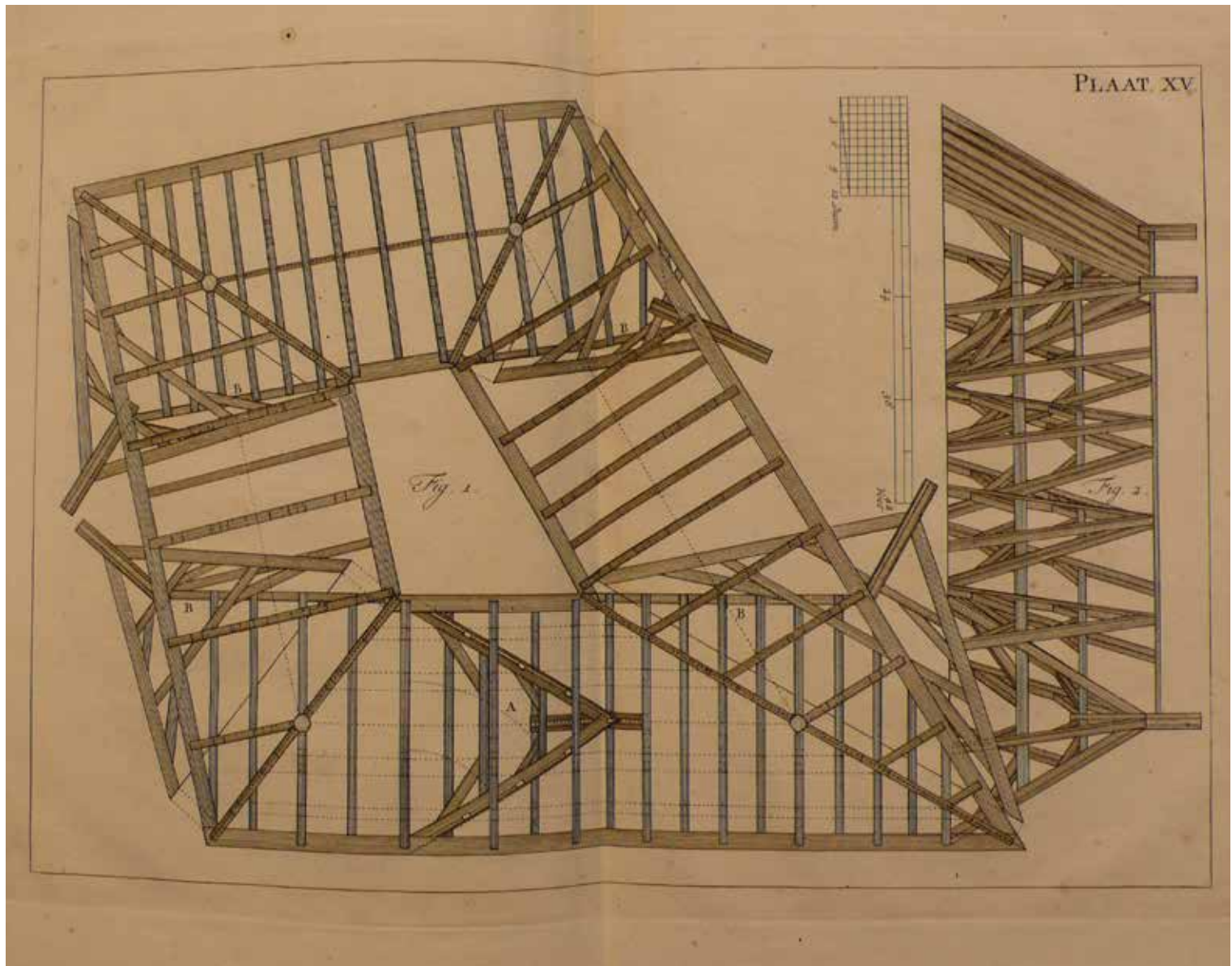
The case of the Danckerts press makes clear that in the Dutch Republic the interest in autonomous information on building techniques arose relatively late. Even the Danckerts dynasty, based in the internationally oriented city of Amsterdam, at the heart of architectural innovation, specialized in architectural books, and leading in printing and publishing, only gradually engaged in this specific genre. For their material, Danckerts mostly looked abroad: first to Italy, then to France and, as is demonstrated here, also to Germany.

On the whole, the role of building technique in the early period of the printed architectural book is quite limited, in any case, this is so for the Danckerts catalogue. In the various gen-

⁵⁵ French and German translations by Pieter Schenk in 1737 and 1738 respectively. Dutch reprint by Schenk in 1757-1774; and by Willem Holtrop & Nic. Theod. Gravius in Amsterdam, 1774.

⁵⁶ German translation in 1739, 1763, 1782 (as part of J.J. SCHÜBLER, *Nützliche Anweisungen*) and 1790. See also D. VAN DE VIJVER, *Ingenieurs en architecten op de drempel van een nieuwe tijd* (1750-1830), Leuven 2003, pp. 62-63.

⁵⁷ More information on the publications by Van Zyl, Van der Horst, Van Natrus and Polley in N. ROSSBACH, *Poesis der Maschine*, Berlin 2013, pp. 239-264.



res discussed, actual building techniques can only be traced to a very limited extent. It is perhaps more precise to speak of technical details in the *communication* of architecture. In the first stage a 'technical', that is, professional, Dutch vocabulary was developed together with simplified methods for dimensioning the column orders. Then there was a limited interest in building materials, as the work of Goeree, Bommenee and the interest in the Italian Rusconi show. The professional representation of buildings by measured drawings, ground plan, elevation, and section, which mostly contain details of their construction, were equally inspired by the Vitruvian tradition. Fortification and perspective were scientifically developed within the domain of mathematics. Around 1680 Danckerts' *Architectura civilis* was a turning point. In the guise of an ordinary architectural book, for the first time a publication was fully dedicated

to the technique of wood constructions (roofs and stairs), displayed by an advanced projection, and described in an architectural jargon. Only around 1700, when the heyday of Dutch classicism was over, books on actual building techniques and construction appeared, combining text and, often magnificent, engravings. Books on elements of civil architecture (roofs, stairs) were now accompanied by publications on engineering (mills, sluices, bridges). It was only then that building technique in the strict sense found its way to books. In this development the Danckerts press proved to be a keen adapter of foreign material, a pioneer in the Dutch architectural book, and a source of inspiration for what would become an independent technical book genre.

Fig. 14 POLLEY, *Architectura civilis... cit.*, pl. XV (Amsterdam, University, Coll. University Library, shelf mark OTM: KF 62-2564).